by Miss E. N. Thomas, Mr. Parkin, Prof. Bower, and others.

Prof. H. H. W. Pearson, of Cape Town, contributed a note on the morphology of endosperm, in which he described the development of the endosperm in Welwitschia and discussed the homologies of this tissue with the endosperm in the angiospermous embryo-sac. At an early stage of development of the endosperm of Welwitschia all the cells are multinucleate, while at a later stage each cell has a single nucleus (Pearson, Phil. Trans. R. Soc., 1906). An examination of material collected in 1907 showed that the latter condition is brought about by the fusion of nuclei in the cells of the young endosperm. The original nucleus of an embryo-sac produces by repeated division rather more than 1000 nuclei; the sac then elongates, and the free nuclei are re-distributed, with the result that two regions are differentiated, a micropylar region with scattered nuclei and a lower region with more crowded nuclei. The sac is next divided into compartments, those at the micropylar end having two to six, and the others usually twelve or more nuclei. The compartments containing more than six nuclei are converted by nuclear fusion into uninucleate cells; the nuclei in the micropylar compartments remain free, and the wall of each "cell" grows upwards into an embryo-sac tube ("prothallial tube"), into which pass the nuclei and cytoplasm; these nuclei are functional gametes. The conclusion is that the endosperm of Welwitschia represents a new organism, which it is proposed to call the *trophophyte*, intercalated in the life-cycle, belonging neither to the sporophyte nor to the gametophyte. It is the opinion of the author that the trophophyte of Welwitschia is phylogenetically related to the endosperm of angiosperms.

On Tuesday Prof. Weiss read a paper on the primary wood of Lepidodendron and Stigmaria. A new Stigmaria was described in which the xylem of the stele consists of a central strand of long, narrow, protoxylem-like elements mixed with parenchyma, surrounded by normal centrifugal secondary wood. This type of stele was compared with that of *Selaginella spinosa* and of the "hypocotyl" of *S. Kraussiana*, and also with that of *Lepidodendron selaginoides*. The general relations of the steles of the Lepidodendreæ were discussed.

Mr. H. H. Thomas communicated a paper by Mr. Newell Arber and himself on the structure of *Sigillaria scutellata*, Brongn. This was the first full account of the structure of a Sigillarian stem of the Rhytidolepis type. The primary xylem of the stele forms a continuous ring of scalariform tracheids surrounding the medulla. Secondary xylem is also present. The characteristic external ribs are really formed of cortical tissue, not of fused leaf-bases, and are largely composed of phelloderm. A ligule in its pit was demonstrated for the first time. The leaf-trace in the leaf-base contains a double xylem strand with widely separated xylem groups of the Sigillariopsis type.

Mrs. D. H. Scott described some curious spindle-shaped bodies in Burntisland material, naming them *Bensonites fusiformis*. She inclined to the view that they are glandular structures belonging to *Stauropteris burntislandica*, with which they are associated. A sporangium of this species was found to contain germinating spores.

Miscellaneous Papers.

On Thursday Colonel H. E. Rawson contributed a striking account of colour changes in flowers produced by controlling insolation. He has found that by shading various plants (such as nasturtiums) from the direct rays of the sun during certain hours of the day the colours of the flowers produced are changed from scarlet and orange to mauve, and in other cases to deep carmine. The variations thus produced breed true, both from cuttings and seeds. In other instances bronze, old-gold, rose-salmon, and sallow flesh-coloured flowers have been produced by similar means. Dahlias and other flowers appear to be as susceptible as nasturtiums to this treatment.

Mr. W. L. Balls contributed two papers on the mechanism of mitosis and on the natural crossing of the cotton plant.

Mrs. D. H. Scott read a paper on the contractile roots of the aroid *Sauromatum guttatum*, in which she showed that if the tuber of this plant is planted on the surface of the soil it throws out leaves and subsequently disappears below the surface, and in two months' time is found at a depth of 6 inches. The descent is caused by the thick fleshy roots sent out from the upper surface of the tuber, which firmly attach themselves to various objects in the soil, and then contract to about half their original length, pulling the tuber down. Later on these contractile roots are cut off from the tuber by regular alseris layers. If the tuber is replaced on the surface it sends out a fresh set of contractile roots, and is again pulled down to the normal depth.

Mr. M. Wilson contributed notes on the life-history of *Haematococcus lacustris*, in which he described the results of various culture experiments on this species. The red cells were found to be produced in starved liquid cultures, and to be alone capable of withstanding the effects of drying. Dr. Lotsy contributed an interesting paper on the segregation of characters of a perfectly fertile species-hybrid.

Mr. Harold Wager made a contribution on the optical behaviour of the epidermal cells of leaves. He discussed Haberlandt's theory that the convergence of light rays brought about by the lens structure formed by the papillæ of the epidermal cells of many leaves brings about a differential illumination of the protoplasm on the basal wall, and thus creates a stimulus which results in the appropriate orientation of the leaf to the incident light. It was pointed out that the objection to this theory, based on the absence of epidermal lens papillæ from heliotropically sensitive grass-seedlings, may be met by the fact that the epidermal cells of the first (sheathing) leaf and of the young leaves enclosed in the sheath do actually cause convergence of light rays in spite of the absence of papillæ. In the author's opinion too little attention has been paid to the view that the lens structures in question may be concerned with the more efficient illumination of the chloroplasts. It is also possible that the structures in question are accidental, and not to be regarded as adaptations, since they also occur on the lower epidermis of various leaves, on the epidermis of some petals, and in the fungus Russula. Mr. Wager exhibited well-defined photographs of various objects made through these epidermal lenses.

Monday morning was devoted to a joint discussion with Section D on the determination of sex. This is reported in the article on "Zoology at the British Association" (NATURE, October 22, vol. lxxviii., p. 647).

Members of Section K were fortunate in being able to meet in Prof. H. H. Dixon's beautiful new botanical institute at Trinity College, where everything was arranged for their comfort and convenience.

The sectional excursion was held on the Saturday to the Murrough of Wicklow, a long stretch of shingle beach backed by marsh, under the leadership of Mr. R. Lloyd Praeger.

MR. LLOYD GEORGE ON THE ENDOWMENT OF UNIVERSITIES.

ON November 13 the University of Wales conferred the degree of Doctor of Laws, *honoris causa*, on Mr. Lloyd George. At the complimentary banquet given by the University College of North Wales, Lord Kenyon announced a donation of 1000*l*. from Sir Herbert Roberts to the college building fund. In replying to the toast in his honour, Dr. Lloyd George alluded to the sacrifices the Welsh people have made in building up their system of higher education, and pointed out that the University of Wales has entirely altered the status of the Welsh people. It would be the worst thing for the Government to take the task entirely out of their hands, but the time has arrived for the Government to render further assistance, and one great need of the colleges is a very commonplace one—cash. Further assistance of a substantial character would make a vast difference in the immediate prospects. One of the ablest committees has investigated the claims of the Welsh colleges, and the conclusions arrived at are very favourable. The committee indicated several directions in which more could be done if the colleges had more money.

Dr. Lloyd George had to consider the report of the committee, and it was his duty as Chancellor of the

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Exchequer, viewing the circumstances of Wales, Ireland, England, and Scotland, to make a very substantial contribution to the funds of the University. The building fund of the college at Bangor has already received a Treasury grant (20,000*l*.), and it is the duty of the people of North Wales to complete that work; but in regard to what has been said about raising the status and improving the staff and equipment of the college, Dr. Lloyd George fully approved of every word. One of the first things will be to increase the salaries of those who have devoted their ability to establishing and maintaining higher education in Wales. It cannot be expected that the services of the best men will be secured at the present inadequate salaries. The sacrifices made by those who have remained on in spite of better inducements elsewhere are appreciated, but the time has come to recognise the fact that if a first-rate staff is wanted it must be made worth while for the members of the staff to remain. At present the professors too often do work which ought to be relegated to tutors.

Turning to the question of research, Dr. Lloyd George pointed out that what is wanted is not only teachers, but also explorers. Science has its dark continents, unlimited continents—mapless, unlimited oceans—chartless. He would believe in the triumph of Welsh education when he could see sheets that are now mere outlines crowded with the discoveries of Welsh explorers. The greatest universities are, however, not the product of thirty years. There should be closer contact between the universities and the Welsh industries. Germany has said, "You must have a university to teach and to educate and to develop the German mind," and now the effect is seen in the German industries.

Dr. Lloyd George went into one of the largest workshops in Germany three months ago, and was taken round by a professor. He asked what a professor had to do with it, and was told "The professors are our experts." The Germans get their ideas from their professors. We in this country heave coal and blast rocks, but the great industries that finish these products are elsewhere. We must start as discoverers. All this is coming. Bangor has two factories, one in the lower town and one new factory the buildings of which are beginning to rise in Upper Bangor, while in Cardiff, also, new buildings have been erected for the University College, which, however, are not nearly so fine and imposing as the municipal buildings. These are the factories where the future of the country is being forged. There is no investment that will produce such a return, not to the investor, but to generations to come, as the endowment of higher education. The Chancellor of the Exchequer further referred to what has been done in the past by the people of Wales, the need of private as well as public support, and the future prospects of the University.

G. H. B.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Mr. J. M. Dobbs has been appointed chairman of the examiners for part i. of the mathematical tripos, 1909 (old regulations), and Mr. Fitzpatrick chairman of the examiners for the natural sciences tripos, 1909.

The general board of studies has approved for the degree of Doctor in Science Prof. W. W. Watts, F.R.S., and Prof. T. J. I'A. Bromwich, F.R.S.

The general board of studies will shortly proceed to the appointment of a university lecturer in zoology. Candidates are requested to send their applications, with testimonials if they think fit, to the Vice-Chancellor on or before December 2.

Mr. A. Wood has been appointed demonstrator of experimental physics.

LONDON.—The Senate of the University has awarded the Rogers prize of 100*l*. for original research in medical science to be divided equally between Dr. David Forsyth, assistant physician to Charing Cross Hospital, and Mr. F. W. Twort, assistant bacteriologist to the London Hospital.

MANCHESTER.—The completion of the new buildings of the Manchester Royal Infirmary, in close proximity to the University, has already led to a marked increase in the number of students entering for courses in the medical school. The new hospital, which is to be formally opened next year by His Majesty the King, is to be occupied by the end of the present month.

The new buildings of the engineering department are making rapid progress, and a portion is already in use. The extension of the chemical laboratories has also been commenced; the additional accommodation, which will cost from 15,000*l*. to 20,000*l*., will be primarily devoted to the increasing requirements of research in organic chemistry.

The establishment of a new chair in botany, for which an endowment was received some months ago, is in contemplation.

The Court has resolved to recognise the Harris Institute, Preston, as a privileged institution, attendance at courses in mathematics, physics, and chemistry being accepted as satisfying the attendance requirements for the Inter. B.Sc. and Inter. B.Sc. Tech. courses.

Up to October 30 the number of students who have entered for courses of study in the University is 1320, against 1219 a year previously.

DR. GEORGE DEAN, chief bacteriologist at the Lister Institute of Preventive Medicine, has been appointed to succeed Prof. D. J. Hamilton in the chair of pathology in the University of Aberdeen.

MR. G. H. KENRICK, Lord Mayor of Birmingham, has made a gift of 10,000*l*. towards the funds of Birmingham University. This is his third contribution toward the development of the University, his total gifts amounting to a sum of 25,000*l*.

MR. H. G. WELLS will preside at the first annual dinner of old students of the Royal College of Science, to be held at the Criterion Restaurant, Piccadilly Circus, on Wednesday, December 9. Dinner tickets, price 7*s*. 6*d*., may be obtained from the honorary secretary of the dinner committee, Mr. T. L. Humberstone, 3 Selwood Place, Onslow Gardens, London, S.W. It is hoped that the dinner will lead to the formation of an association of old students of the college.

PROF. PERRY has again sent us the balance-sheet referring to bursaries distributed by him to students at the Royal College of Science, South Kensington, during the two sessions 1906–7 and 1907–8. The fund for these bursaries represents a response to an appeal made by Prof. Perry for the means to assist deserving students at the college with secret gifts when necessary, it being understood that every student who receives such assistance shall repay the money to the fund when in a position to do so. Among the contributions to the fund are 100*l*. each from the Drapers', Goldsmiths' and Skinners' Companies, and 50*l*. from the Clothworkers' Company. As a number of students at the college have to maintain themselves and purchase their books and instruments out of scholarships having a value of about 17*s*. 9*d*. a week each, the institution by Prof. Perry of a system of small bursaries privately bestowed has provided a means of preventing unnecessary privation without injuring the self-respect of the recipients.

A COMMON criticism of the methods of teaching science adopted in schools for girls is that they are too academic and have little or no bearing upon the duties the girls will be called upon to perform in after life. This weakness is, we are glad to know, becoming less common, and earnest efforts are being made in several centres to arrange courses of work in which elementary science and the home arts are taught together, the latter being treated largely as applications of the former. In a recent address to the Teachers' Guild, Mr. John Wilson, president of the Association of Technical Institutions, dealt exhaustively with the methods by which science can be connected with domestic training. His address is printed in *Education* for November 6 last. Mr. Wilson is of opinion that, ideally, the teacher should be a woman, thoroughly well skilled in chemistry and physics, &c., and a first-class diplomée in cookery, laundry work, and housewifery. At

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